REMARKS

The applicant appreciates the Examiner's thorough examination of the application and requests reexamination and reconsideration of the application in view of the preceding amendments and the following remarks. The amendments presented above contain no new matter and raise no new issues.

The Examiner states that the title of the invention is not descriptive, stating that a new title is required that is clearly indicative of the invention to which the claims are directed. The applicant has amended the title of the invention, and submits that the title is sufficiently descriptive of the invention to which the claims are directed.

The Examiner rejects claims 1-6, 8-15, and 17-19 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,549,003 to *Drescher-Krasicka*.

The applicant's amended claim 1 recites a defect detection system comprising an excitation laser system for projecting a laser beam at the near surface of a sample to be tested for generating acoustic longitudinal, surface Rayleigh, and shear waves in the sample, a detection laser system spaced from said excitation laser for projecting a laser beam and to intercept shear waves reflected from the far surface of the sample at approximately the angle of maximum shear wave propagation and minimize interference with longitudinal and surface Rayleigh waves, and a detection circuit for detecting the energy level of the reflected shear wave intercepted by said detection laser system representative of a flaw in the sample.

In contrast to the applicant's claimed invention, *Drescher-Krasicka* does not disclose excitation and detection laser systems that both project laser beams; the former for generating acoustic longitudinal, surface Rayleigh and shear waves in a sample; the latter spaced from the excitation laser to intercept shear waves reflected from the surface of the sample. While

Drescher-Krasicka discloses that "laser induced ultrasonic waves may also be substituted for the acoustic microscope 10" (see column 12, lines 55-58), *Drescher-Krasicka* does not disclose an embodiment including a detection laser system for projecting a laser beam. Also, *Drescher-Krasicka* does not disclose an embodiment that does not include the single lens for both transmitting and receiving the transmitted and ultrasonic waves (element 5 in Figs. 5 and 6b and element 40 in Fig. 6d). Instead, *Drescher-Krasicka* discloses a single lens having with a surface having a spherical or cross-sectional concave shape from which ultrasonic vibrations are transmitted and received.

Moreover, *Drescher-Krasicka* does not disclose spacing the detection laser system from the excitation laser to intercept waves reflected from the far surface of the surface of the sample at approximately the angle of maximum shear wave propagation and minimizing interference with longitudinal and surface Rayleigh waves. In contrast to the applicant's claimed invention, *Drescher-Krasicka* discloses either creating a three-dimensional image using surface wave images, and longitudinal wave images, and shear wave images (see, e.g. column 17, lines 20-56), or identifying particular ultrasonic arrivals and choosing polarized modes for imaging (see, e.g. column 13, lines 43-46). *Drescher-Krasicka* neither discloses a relationship between the angle created by spacing the excitation laser system from the detection laser system thus maximizing propagation of shear waves and minimizing interference with longitudinal and surface waves, nor using this relationship advantageously for flaw detection in a sample.

The applicant's invention appreciates that the angle of maximum propagation for longitudinal waves decreases with increasing angle, while the shear wave has its maximum propagation at an angle which is a function of the spacing between the excitation laser system and the detection laser system. The applicant uses this claimed defect detection system, not

disclosed by *Drescher-Krasicka*, to identify the size, location and orientation of a flaw in a sample. See also the applicant's specification at page 9, lines 1-8.

The Examiner asserts that the bounds of the expression "approximately" are unknown and therefore any angle of interception for the shear waves is considered "approximately" the angle of maximum shear wave propagation. This is not the case. As the applicant sets forth in the specification, the angle of maximum propagation of longitudinal waves decreases with increasing angle. The shear wave has its maximum propagation at an angle where longitudinal wave propagation is decreasing. In the applicant's claimed invention, the angle of maximum shear wave propagation also minimizes surface and longitudinal waves. This angle will vary depending on several variables including the sample material, whether the surface is wet or dry, and the shape of the sample. Nonetheless, the applicant recognized this relationship, took advantage of it, and derived mathematical formulas in that connection. The applicant discloses various formulas for calculating the claimed angle of maximum propagation. See, e.g., the application at page 9, line 1 through page 10, line 8. Thus, one skilled in the art would recognize that the claimed approximate angle of maximum shear wave propagation as claimed does not include any angle of interception of the shear waves, but instead would include the angle of maximum shear wave propagation that minimizes surface and longitudinal waves.

In summary, in contrast to the applicant's claimed invention, *Drescher-Krasicka* does not disclose a dual laser system. *Drescher-Krasicka* does not disclose such systems spaced from one another. *Drescher-Krasicka* does not disclose intercepting shear waves reflected from the far surface of the sample at approximately the angle of maximum shear wave propagation and minimizing surface and longitudinal waves.

Accordingly, claim 1, as well as claims 2-6 and 8-11 which depend directly or

indirectly from claim 1, are in condition for allowance.

Moreover, independent claim 12 claims a method of detecting a defect in a sample that includes photo-acoustically detecting acoustic waves with an excitation laser beam at a first point, photoacoustically detecting acoustic waves with a detection laser beam at a second point spaced from the excitation first point for intercepting shear waves reflected from the far surface of the sample at approximately the angle of maximum shear wave propagation and minimizing interference with longitudinal and surface Rayleigh waves, thus including the same elements discussed above in claim 1 that distinguish claim 1 from the cited reference *Drescher-Krasicka*. Accordingly, independent claim 12, and claims 13-15 and 17-19 which depend directly or indirectly from claim 12, are also in condition for allowance.

Additionally, the applicant's dependent claims include elements not disclosed in *Drescher-Krasicka*, for example, a measuring circuit for measuring the length of each shadow cast by a flaw blocking shear wave propogation and the distance between those shadows (claim 9). In contrast, *Drescher-Krasicka* discloses black, white and grey areas.

The Examiner also rejects claims 7 and 16 under 35 U.S.C. §103(a) as being unpatentable over *Drescher-Krasicka*. The Examiner states in essence that with respect to claim 7 it would have been obvious to one of ordinary skill in the art to include a second logic circuit to prevent a false positive reading; and with respect to claim 16 that it would have been obvious to one of ordinary skill in the art to sense the surface Rayleigh waves to inhibit flaw detection according to a predetermined energy level to prevent a false positive reading.

Dependent claim 7 depends ultimately from independent claim 1, and dependent claim 16 depends from independent claim 12. As discussed above, *Drescher-Krasicka* does not disclose all of the elements of the applicant's independent claims 1 and 12, and therefore does

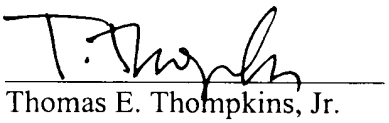
not disclose or teach all of the elements included in claims 7 and 16. Accordingly, claims 7 and 16 are also in condition for allowance.

CONCLUSION

Accordingly, claims 1-19 are in condition for allowance. Each of the Examiner's rejections has been addressed or traversed. It is respectfully submitted that the application is in condition for allowance. Early and favorable action is respectfully requested.

If for any reason this Response is found to be incomplete, or if at any time it appears that a telephone conference with counsel would help advance prosecution, please telephone the undersigned or his associates, collect in Waltham, Massachusetts at (781) 890-5678.

Respectfully submitted,



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TET/ok